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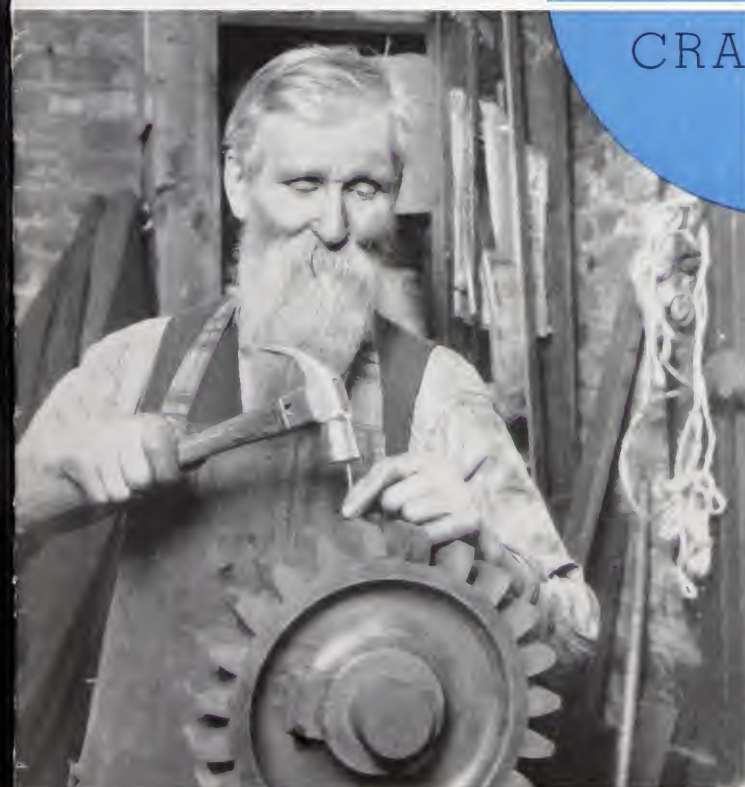
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LAHO WHITE PINE

IDEAL FOR WOOD PATTERNS

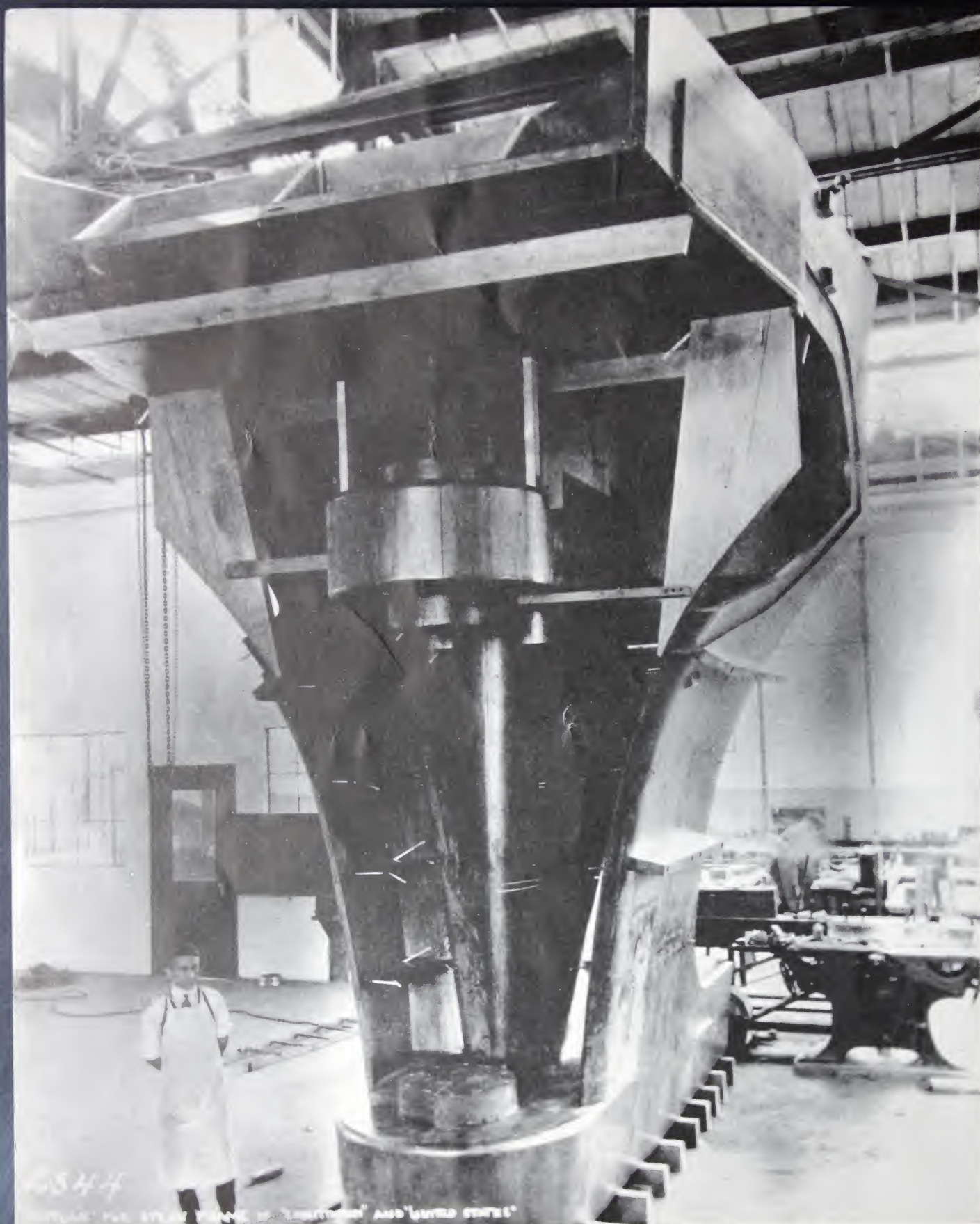


SO SAY
Expert
CRAFTSMEN



FRANKLIN INSTITUTE
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WESTERN PINE ASSOCIATION - YEON BUILDING - PORTLAND, OREGON



Idaho White Pine was used for this mammoth pattern for the stern frame of U.S.S. Constitution and U.S.S. United States at Philadelphia Navy Yard.

STUTTARD MILLWRIGHT
PHILADELPHIA



(Left) Idaho White Pine pattern for a stiff leg iron for a crane or derrick and (Right) skilled craftsmen using this ideal wood for other patterns.

IDAHO WHITE PINE IDEAL FOR WOOD PATTERNS

The Genuine White Pines

If it were possible to hold a plebiscite of the commercially important softwoods grown in the United States, there is little doubt about the outcome of the election. Genuine White Pine is the leader and has been for a long time. True, some of the places where genuine White Pine has been used for scores of years have been taken by other species less costly and of lower intrinsic value, but in places like *pattern making* where the purchase price of the material is relatively unimportant, due to the vastly higher labor expense of making patterns, genuine White Pine still stands supreme.

There are, of course, three genuine White Pines—Northern White Pine (*Pinus strobus*), Sugar Pine (*Pinus lambertiana*) and Idaho White Pine (*Pinus monticola*). Northern White Pine is not as plentiful as it once was. There is still considerable cutting in the northern wood, but the stock usually finds its way into construction and specialty uses. Also, the wide, thick pieces needed by a pattern maker are not as common now in Northern Pine because of the smaller size of logs.

Idaho (genuine) White Pine

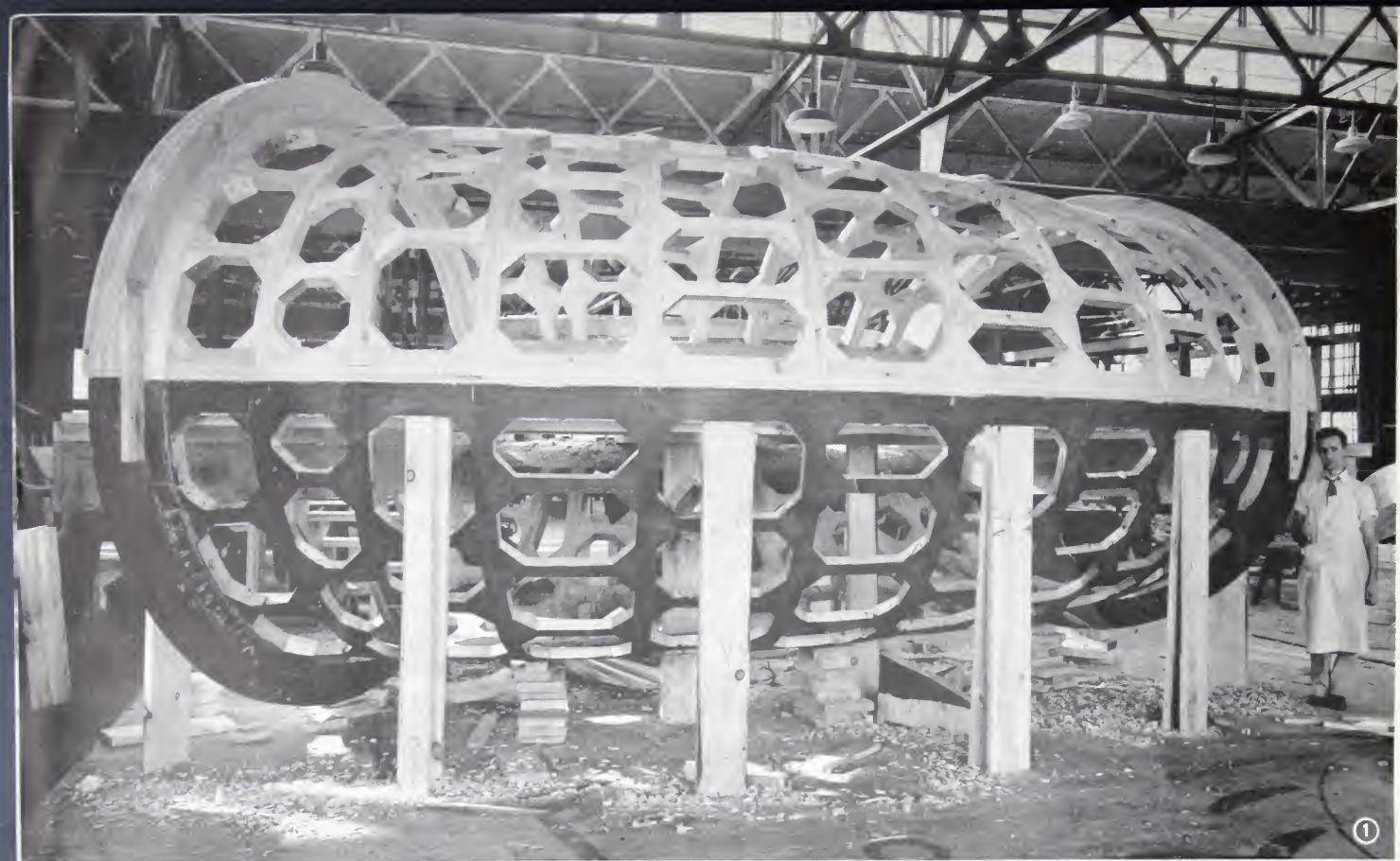
In the Inland Empire of the Pacific Northwest, where Idaho White Pine grows, the situation is different. Production of high quality pieces, suitable for pattern and factory purposes, is an important part of the work of the Idaho mills in harvesting the crop of old-growth pine trees into a product used by the industry in large quantities. The problem of logging, cutting, drying and shipping Idaho White Pine for pattern uses has been mastered by the operators in this section and the result of the effort is felt in pattern shops throughout the country.

Why Pattern Makers Like This Wood

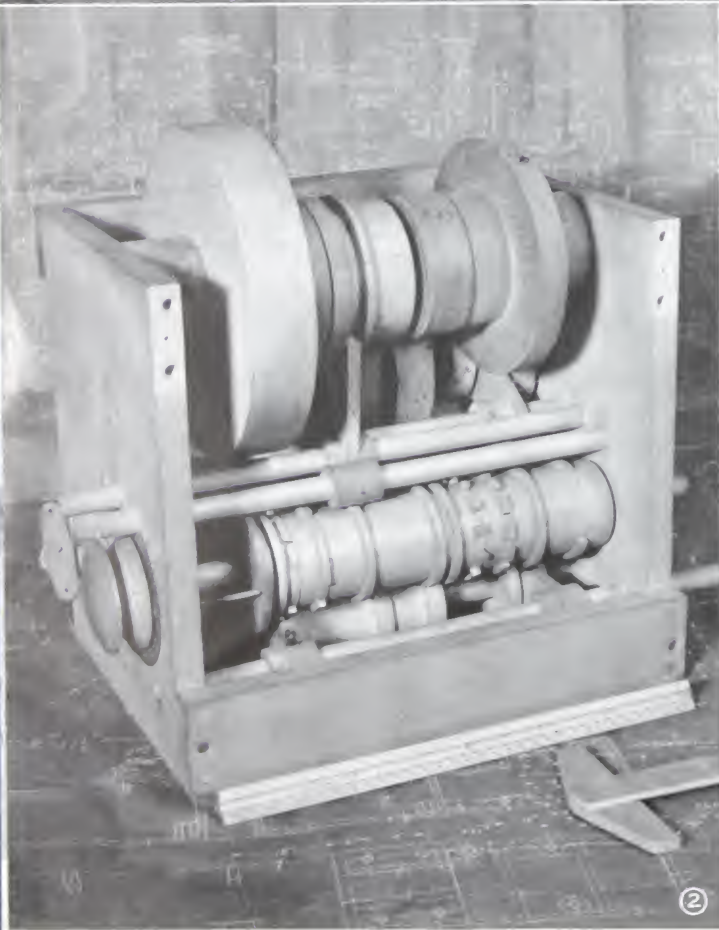
It is for a very definite reason that the pattern maker chooses Idaho White Pine for his work. Pattern making is an art, and when a pattern maker chooses Idaho White Pine for his work, it is for the same reason that any other artist feels that results are more satisfactory when he is working with his chosen medium. Perhaps the pattern maker would not state it this way but would rather tell you the reason he likes to work with Idaho White Pine is because of its easy cutting in any direction. This is absolutely necessary. He might tell you it is soft and free from pitchy substances, and his tools stay sharp longer. If you say it is so soft it requires extremely sharp tools, he no doubt will assume a hurt expression and tell you that a real mechanical artist does not have any use for other than sharp tools. He will tell you it is light in weight but not too light. It is heavy enough to give the necessary strength to large, difficult-to-handle patterns. The pattern maker knows the importance of a lack of excessive swelling and shrinking in a pattern wood. A pattern's usefulness depends on its ability to stay in shape, and Idaho White Pine, properly seasoned, will do just that. A pattern maker will tell you there is a certain amount of wear in a pattern that is used often, and the ideal pattern wood must be able to resist abrasion and be tough enough to stand up under severe usage. Idaho White Pine is a long-fibered wood, possessing relatively high sheer values.

If a pattern maker were to continue to tell why Idaho White Pine is a favorite wood, he would tell you about its gluing qualities, how it absorbs glue uniformly and permits building up of large and complicated shapes, which have adequate strength. He will tell you it is necessary at times to nail the wood

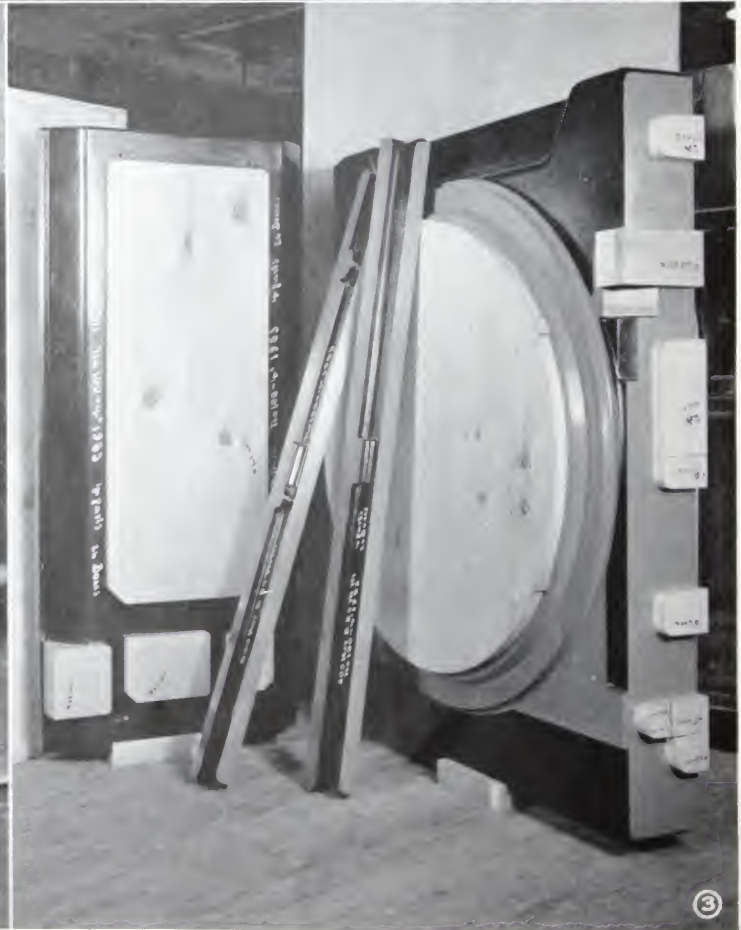
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Idaho White Pine patterns of (1) Pelton water wheel for Boulder Dam power plant, Baldwin Locomotive Works, Eddystone, Pa.; (2) and (3) working model head of 5" multiple speed horizontal boring, drilling and milling machine and saddle for revolving table of same machine, Wm. Sellers & Co., Philadelphia, Pa.

and the wood must be such that it will not split. Screws must be used, and the wood into which they are driven must be able to grip the screws tightly. A pattern maker will tell you that the wood he uses for patterns must take and hold paint and shellac so that they will protect the pattern against the action of moisture in the moulding sand. The surface must be smooth and free from any pore marks which might spoil this surface. He will tell you that in every way Idaho White Pine meets his most exacting needs and because this is the case, he continues to use this marvelous wood.

Plentiful Supply

Another important item a pattern maker might not mention, but an equally important matter in the selection of a pattern wood, is the ready availability of the species in a good variety of grades, sizes and quantities. Since a pattern maker may not be familiar with this part of the subject at hand, it should be said that this is an outstanding feature of Idaho White Pine pattern lumber. Because of the abundant supply, the pattern maker is afforded a wide variety of stock from which he may select the most economical type and grade for his purpose. It is available in the Select and Factory grades up to 4 inches in thickness and is given special attention at drying time to make it uniformly dry before leaving the sawmill. The correct drying of thick pattern items is an art in itself, and one which has had the attention of the best minds in the lumber industry for many years.

Pattern Makers Know Wood

The fact that pattern makers insist on having Idaho White Pine for their exacting work is no faint praise for this species. A pattern maker must be proficient in three distinct trades. He must, primarily, be a foundryman, thoroughly familiar with the strength of various metals after being poured into the mould. He must know what gray iron will do under certain conditions. He must know how brass, aluminum or cast steel will react. He must know how cast, etc., will

work under certain conditions. In other words, all the intricacies of foundry work must be common knowledge to a good pattern maker.

Next, he must know how to work with wood. He must know how to place the grain of wood so it will work with the other members of his pattern. He must know how the pattern is to be finished, whether paint, shellac or varnish should be used to give the smooth, even surface required in a pattern, and lastly, he must be an expert draftsman to be able to translate the drawings of a machine part into the design of his pattern. This means he must know the size of reinforcing members, the amount of metal required to be left when a hole is bored into the casting and, in general, how to lay out his work so that a satisfactory metal unit is produced.

Naturally, the material used in the fabrication of a pattern is a small part of the expense involved, and that is why it pays to buy the best. Is it any wonder then that we say the selection of Idaho White Pine by skilled pattern makers over the length and breadth of the land is no faint praise of this species for their exacting use?

Lumber Grade Requirements Vary

Idaho White Pine is sold in a wide variety of grades, widths and thicknesses for use in the pattern shops of America. The grade of lumber for pattern purposes ranges from the highest grades ("Supreme" is the highest) to "Sterling" (a high-type, knotty board). Some of the larger foundries and industrial plants find that a number of grades are necessary to meet their requirements. For instance, a Common grade, such as "Sterling", may be used for a large machine base requiring thousands of feet of lumber, while some of the smaller parts of the machine may be cast from patterns made of the best grade of Select lumber, like "Supreme". The individual requirements of an industry govern the type of stock selected for pattern makers' use. In the paragraphs that follow, further information is given about the grades of Idaho White Pine that are used by pattern makers.

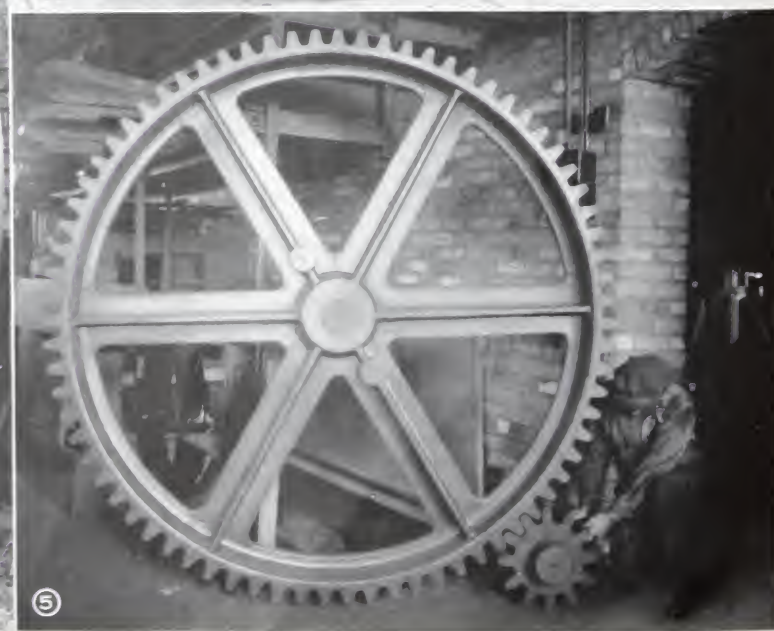
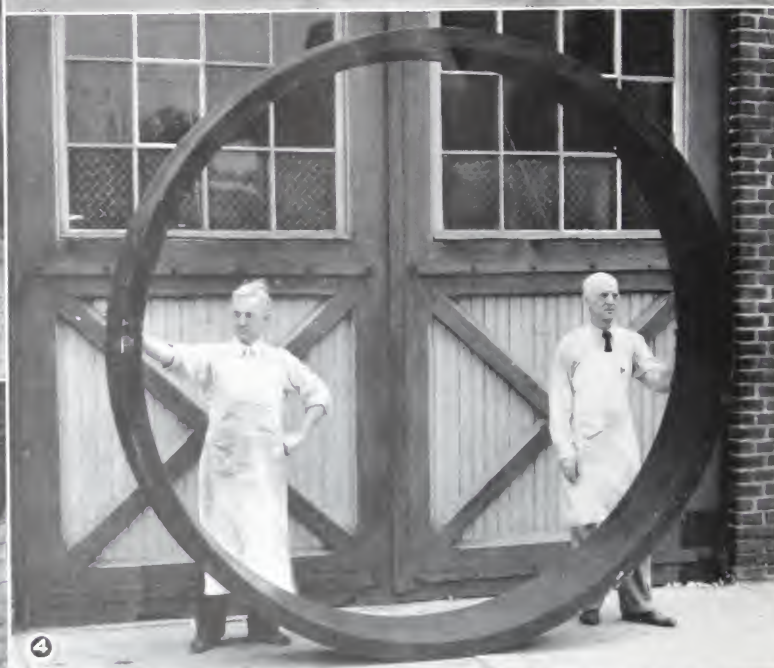
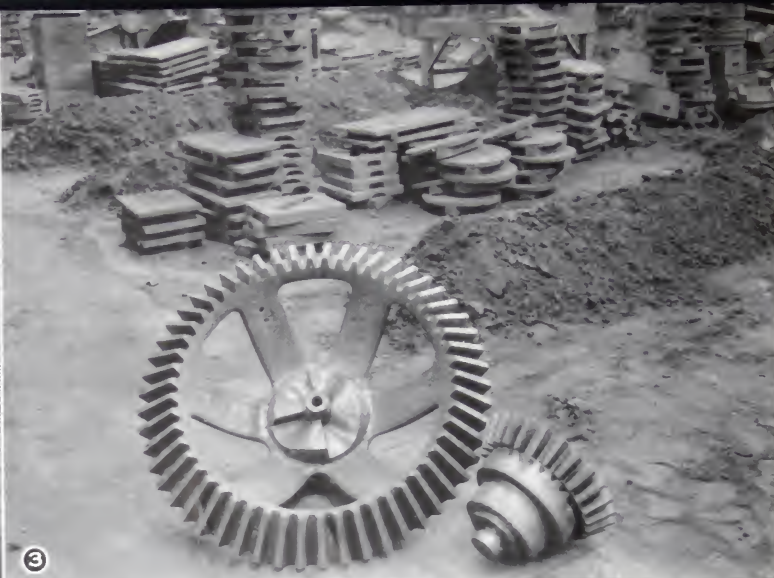
GRADE DESCRIPTIONS

Idaho White Pine lumber for the foundry pattern trade is manufactured, graded and sold under the standard grading rules of the Western Pine Association. No special pattern grades are provided in these rules as eleven of the thirteen standard grades of Idaho White Pine for all commercial uses are suitable for the various types of patterns and flasks. These eleven grades may be classified into three general groups, namely—Selects, Factory and Boards. Each of these grades is described briefly on the following pages and includes pertinent information on the sizes available and their adaptability to the use. To assure uniformly

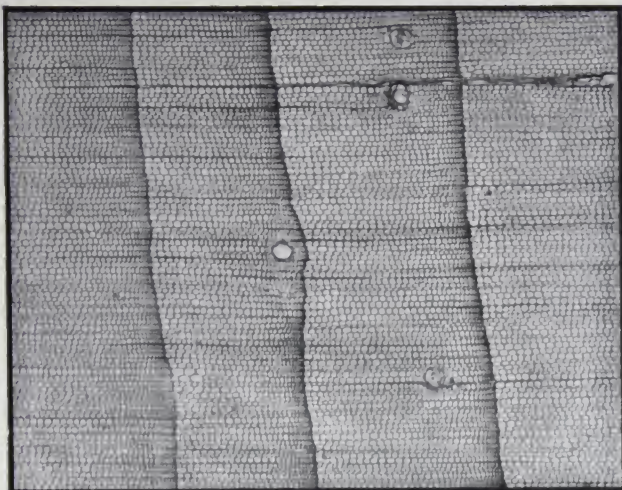
graded stock at all Western Pine Association mills, experienced lumber inspectors employed by the Association regularly check the work of the mill graders at every member plant.

SELECT GRADES

The Select grades include the highest quality of Idaho White Pine lumber. A greater number of the pattern shops find it economical to purchase these grades for all their pattern requirements because of the high percentage of the stock that can be utilized and their suitability for varied use with little waste.



Idaho White Pine has a uniform soft texture, works easily, glues well and stays in place, thus assuring a true casting where precision counts, as shown in these patterns: (1), (2) and (4) sink head patterns, Philadelphia, Pa., (3) dish gear and pinion, and (5) huge gear (diameter 6' 11 $\frac{1}{2}$ "), and pinion for coal hoist, St. Paul, Minn.



Photomicrograph of cross-section of Idaho White Pine showing its thin and even cellular structure throughout both the springwood and summerwood (or grain). This condition accounts for the ease with which Idaho White Pine is milled and hand-shaped.

An important related use for Idaho White Pine Selects is for templates or templets. This calls for a straight-grained, soft-textured wood. For this purpose, the standard grades of "Choice" (C Select) and "Quality" (D Select) are generally used.

The three grades of Select in Idaho White Pine are determined from the best face on the basis of appearance and suitability for use. Wherever possible the grading rules specify the number and size of defects which are admissible in pieces of specified surface areas.

Supreme (B Select & Better)—Idaho White Pine

"Supreme" is, as its name implies, the finest grade produced in Idaho White Pine. Much of the stock is practically perfect and the blemishes or imperfections that occur in the low-line of the grade are always of a minor nature, which do not detract from the high appearance and quality of the grade. These low-line pieces may contain, depending on the size of the piece, two or three small pin knots, or a small amount of light stain, a small dry pitch pocket or several tiny season checks that are hardly visible.

Choice (C Select)—Idaho White Pine

The grade of "Choice" (C Select) Idaho White Pine is also a very high class material, and only by a careful examination of each piece is it possible to discern any marked difference between it and the next higher grade. The characteristics usually found in the "Choice" grade are fine season checks, a small dry pitch pocket, small amounts of light pitch, or light to medium stain. None of these may be in serious combination and in their absence, depending on the size of the piece, the piece may contain from one to four small tight knots, or a larger number of quarter inch pin knots. While this grade admits slightly more and larger defects than are permissible in "Supreme", it is well suited to the very highest pattern uses unless practically clear material is required of every piece.

Quality (D Select)—Idaho White Pine

"Quality" is the lowest standard grade of Select lumber and, while it admits defects and blemishes too serious for the previous grades, it is, nevertheless, a smooth and valuable grade, usable for all foundry pattern purposes which call for a Select grade, yet the requirements are not as exacting as those uses to which the higher grades of Select (Choice and Supreme) are put. The chief characteristics of the grade are small season checks, small pitch pockets, medium stain in otherwise high-line pieces, and in the absence of these, the piece, depending on its size, may contain six or eight small tight knots, or one or two not firmly set small knots, or a number of pin knots one-quarter inch or less in size. A type often placed in this grade is a high-line piece with one serious defect requiring a cut for finish work.

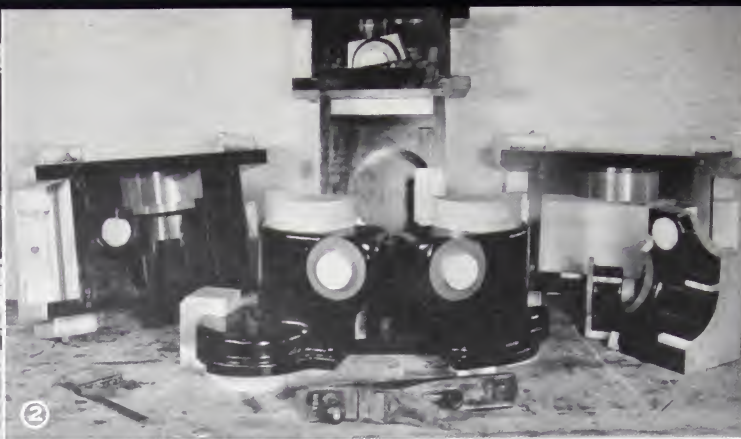
FACTORY GRADES

The Factory grades are the second group of Idaho White Pine grades, which are especially suitable for use in the pattern shop. These are the same Factory grades of lumber regularly used in woodworking plants for the fabrication of sash, doors, frames and cabinet work. The quality or grade of Factory lumber is determined on the cutting value from the standpoint of their utilization for sash and door cuttings, or, in other words, the area or percentage of clear pieces that can be cut out of each board. The Association standard grading rules, under which Idaho White Pine Factory lumber is graded, specify that these clear cuttings must measure in size from 5" or 6" wide by 2'4" to 4'0" in length; 5" or 6" wide by 6'8" to 7'6" in length; to 9" or 10" wide by 2'4" to 3'0" in length.

Every piece in the different Factory grades of Idaho White Pine lumber, as described below, must contain a certain specified minimum amount of clear cuttings within the range of sizes as noted. Most pieces in each grade contain more than this minimum and many of the cuttings are both wider and larger than the sizes described.

An entirely different method is used for cutting up a Factory grade of lumber in a pattern shop than that used for the same board for regular woodworking uses. For the latter purpose, the cuttings generally must be entirely clear and without imperfections while, in a pattern, a few small ones such as a small sound knot or blue stain are not objectionable. By careful utilization in the matter of cutting, as, for example, boxing a larger defect, the production of useful material from the Factory grades for foundry patterns may be considerably increased.

The fact that the Idaho White Pine Factory or Shop grades contain comparatively *small* knots and other defects tends to increase their value for pattern work, as in many instances these minor defects might be concealed in the pattern thus making the material yield almost 100 percent.



Idaho White Pine is used for patterns of all sizes and shapes, as for: (1) housing for 100-ton hydraulic spring stripping press; (2) gear box for 14-foot byring mill; (3) large propeller blade; (4) housing for blower end; (5) split offset nozzle; (6) and (7) core box for 63" octagonal ingot mould, 18 feet long. Pattern (5) made at Lancaster, Pa., all others at Philadelphia, Pa.

Factory Select—Idaho White Pine (5/4 and thicker)

Because the grade of Factory Select is obtainable in such small quantities, it is usually placed in with the grade of No. 1 Shop.

No. 1 Shop—Idaho White Pine (5/4 and thicker)

No. 1 Shop in Idaho White Pine is an exceptionally well suited grade for pattern shops desiring a high class grade for cuttings and one where economy is an essential factor. Its value is based on the percentage of cuttings produced. Then No. 1 Shop must contain 50 percent or more of clear cuttings in each piece.

No. 2 Shop—Idaho White Pine (5/4 and thicker)

The grade requirements of No. 2 Shop Idaho White Pine are much the same as in No. 1 Shop except that a smaller percentage of cuttings is necessary. Each piece of No. 2 Shop must contain 25 percent of No. 1 cuttings or $33\frac{1}{3}$ percent of mixed No. 1 and No. 2 cuttings, or 40 percent No. 2 cuttings (No. 2 cuttings contain one or two small blemishes), in the same sizes as specified for No. 1 Shop. In many instances the pieces placed in this grade are just under the minimum requirements for No. 1 Shop. Furthermore, the knots and other defects found between these clear cuttings are usually smaller in Idaho White Pine than in any other species, which tends to make No. 2 Shop a high quality grade of lumber for pattern use.

No. 3 Shop—Idaho White Pine (5/4 and thicker)

No. 3 Shop is the lowest of the Factory grades and contains a considerable amount of cuttings of comparatively small size, although many pieces will be found in this grade that contain rather large cuttings, which are clear (or nearly so) on one side of the piece, while the reverse side will contain several minor blemishes. No. 3 Shop admits all pieces (5/4 and thicker) below the grade of No. 2 Shop, providing the stock is of a cutting type. Generally speaking, No. 3 Shop Idaho White Pine is a smooth appearing grade and is usable with little waste for patterns where the requirements are not too exacting. It is also used for foundry flasks and core boxes, and for building up patterns.

Inch Factory Select and Inch Shop—Idaho White Pine

Idaho White Pine Inch Factory lumber is graded under slightly different rules from thicker material due to differences in its general use. It is sorted into two grades—Inch Factory Select and Inch Shop. The grade of Inch Factory Select is slightly below the (5/4 and thicker) Factory Select grade. Each piece must produce 70% or more of cuttings. The Inch Shop is slightly higher in grade than (5/4 and thicker) No. 2 Shop, and each piece contains from 50% to 70% of cuttings.

BOARD GRADES

Pattern shops use the Common or Board grades of Idaho White Pine extensively for foundry flasks, facing boards, and for building up heavy patterns and core boxes. "Sterling" (No. 2 Boards) and "Standard" (No. 3 Boards) are the grades generally recommended.

Sterling (No. 2 Boards)—Idaho White Pine

"Sterling" is the second highest of the five Idaho White Pine Board grades and it is a very popular grade because of its suitability for a wide variety of uses and it is a large volume grade. Its general appearance is uniformly higher than a description of its imperfections would indicate. The round red knots are mostly less than $2\frac{1}{2}$ " in diameter and occasionally a piece may contain a spike or branch knot. The grade admits a few small pitch pockets, some seasoning checks, small tight black knots, medium stain, or even a limited amount of heart shake, but not in serious combination.

Standard (No. 3 Boards)—Idaho White Pine

"Standard" Idaho White Pine makes up a sizeable proportion of the total lumber shipped from most of the mills. It is graded much the same as the higher grade of "Sterling" except that the admissible characteristics may be somewhat larger and more numerous. This grade is fairly smooth in appearance and includes many pieces of an otherwise higher Board grade with a slight imperfection that places it in "Standard". Some pieces in this grade show season checks, stain or some heavy pitch or heart shake. In the absence of these the piece may contain some rather coarse knots, or an occasional piece may have a medium size loose knot or knot hole in an otherwise high quality board.

Rough and Dressed Sizes of Idaho White Pine Select, Factory and Board Grades

Thicknesses Rough Surfaced Two Sides

	All Grades	$\frac{25}{32}$ "
1"	"	$1\frac{5}{32}$ "
$1\frac{1}{4}$ "	"	$1\frac{13}{32}$ "
$1\frac{1}{2}$ "	"	$1\frac{13}{16}$ "
2"	"	$2\frac{3}{8}$ "
$2\frac{1}{2}$ "	"	$2\frac{3}{4}$ "
3"	"	$3\frac{3}{4}$ "
4"	"	$4\frac{3}{4}$ "
5"	"	$5\frac{3}{4}$ "
6"	"	

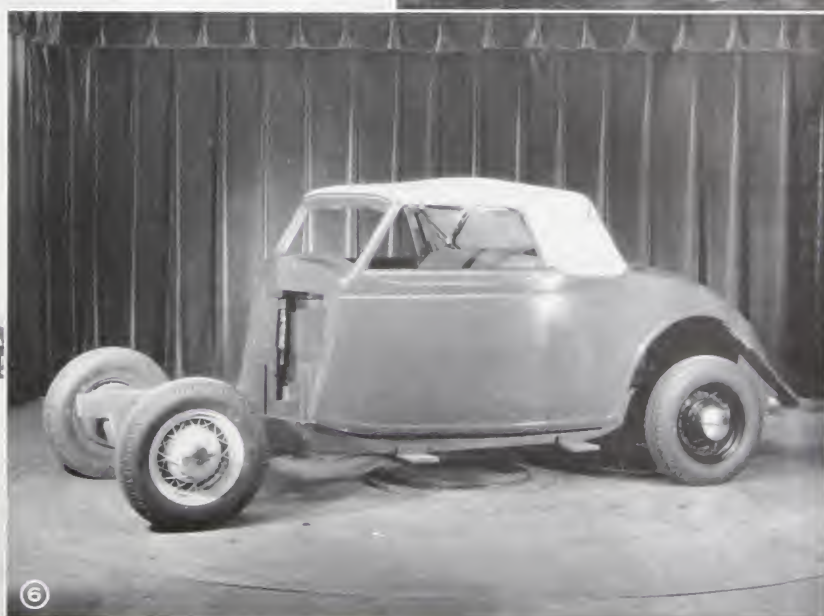
These sizes are furnished regularly, either rough or surfaced, except 5" and 6", which are only occasionally available. Thinner than one inch lumber for templets or other purposes may be secured if required.

Widths and Lengths

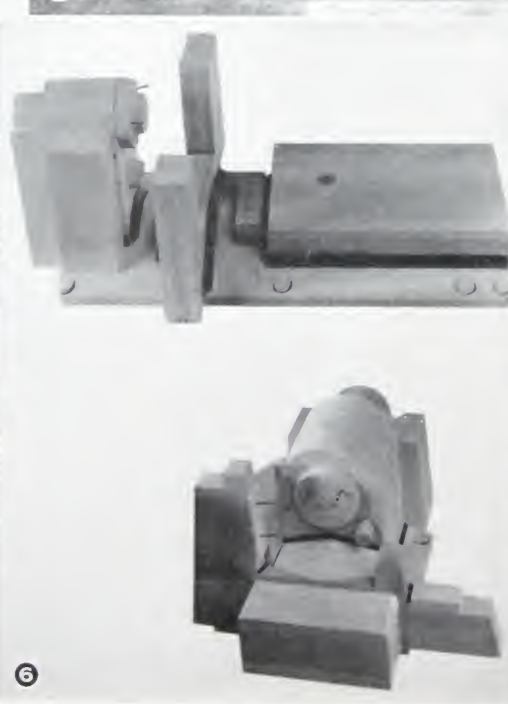
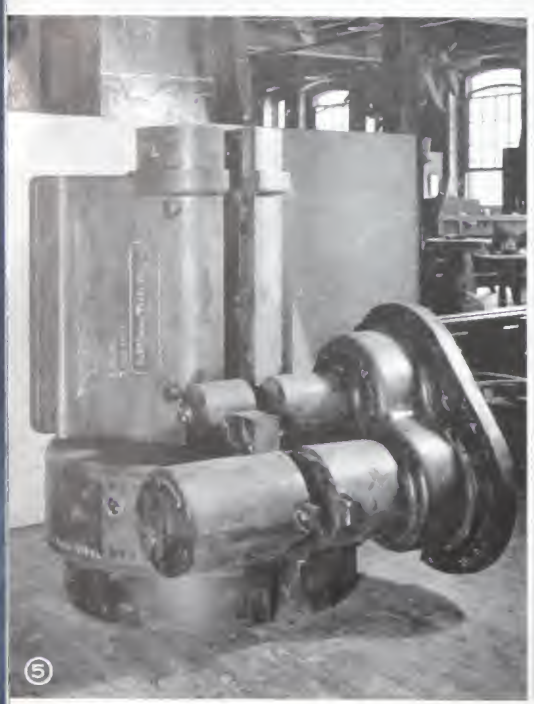
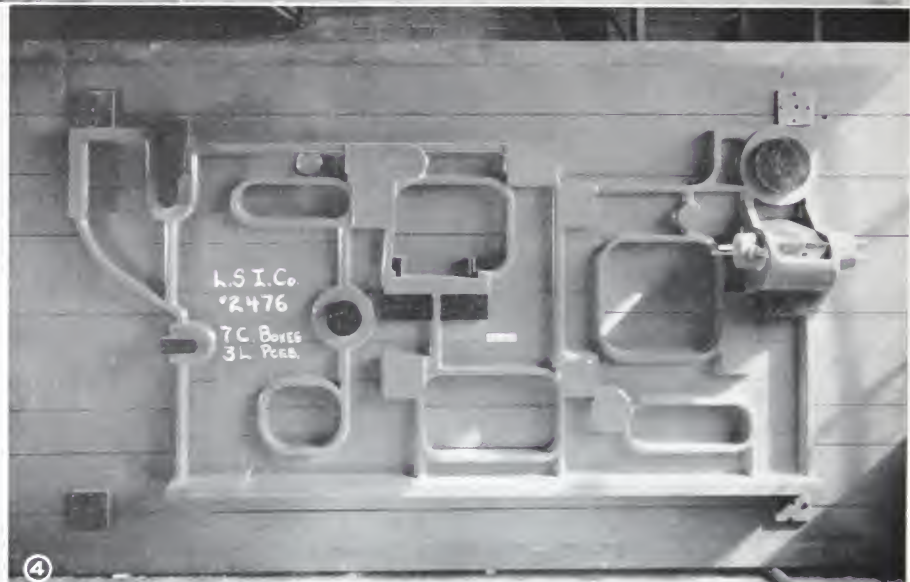
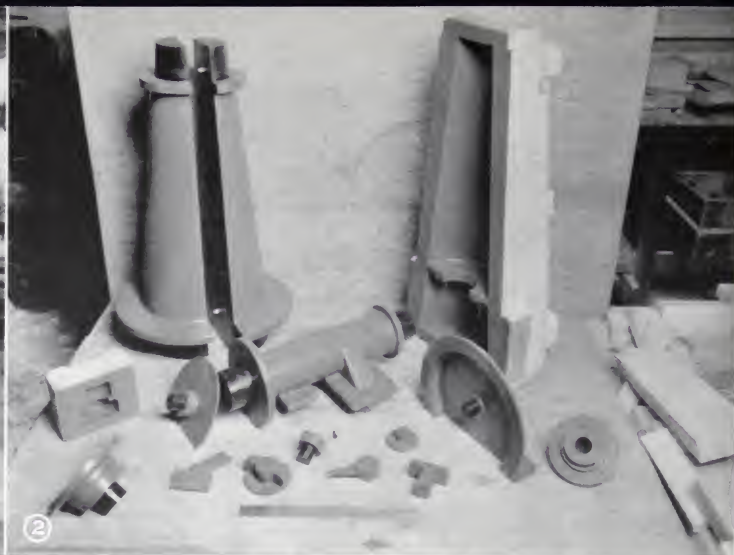
Select grades are furnished in random widths of 6" and wider with a fair percentage of 12" and wider. Factory grades run 5" and wider with only a small percentage of pieces measuring less than 10". In both Select and Factory grades the lengths are random, largely 10 to 16 ft. Boards may be ordered in specified widths and lengths, and run strongly to 12" widths.



Idaho White Pine gives good service no matter whether for flasks or intricate patterns, as these examples show: (1) two and three-piece flasks in constant use in a stove works; (2) moulder preparing flask for casting fire pot for stationary stove; and (3) furnace patterns made by R. C. Fleischmann, Philadelphia, Pa.



Idaho White Pine used for: (1) two-part flask for casting box cap; (2) flasks for moulds of fire pot castings; (3) master patterns for 1½" to 6" cast iron soil pipes, Harry Brown, Pattern Maker, Philadelphia, Pa.; (4) pattern for steam pipe section; (5) pattern of pipe line part for which both Common and Factory grades were used; and (6) dummy auto body, Ford Motor Co., Detroit, Mich.



Idaho White Pine patterns—(1) oil refinery separator bowls, Philadelphia Pattern & Model Co.; (2) parts for boat crane for U. S. S. Light Cruiser Boise, Modern Pattern Works, Philadelphia; (3) two upright members of Diesel engine, Rockford Standard Pattern Shop; (4) side frame for rug loom, W. L. Smith Mfg. Co., Philadelphia; (5) driving gear stand, Wm. Sellers & Co., Philadelphia; (6) support bracket and machinery fixture base, Taylor Pattern Shop, Rockford, Ill.; and (7) framework of cylinder barrel pattern for locomotive.

THE SEASONING OF IDAHO WHITE PINE LUMBER AT THE MILL

Correct Seasoning Important

Correct seasoning is most important for stock to be used in patterns. Any change in moisture content of patterns will cause swelling or shrinking, depending upon whether the wood is absorbing or losing moisture. The responsibility for correct seasoning is divided between the lumber manufacturer and the pattern maker. Any trouble with patterns is usually traceable to incorrect or incomplete seasoning of the stock before being used, or incorrect storage conditions of the finished patterns between periods of use. Of necessity, the lumber manufacturer can season the stock only to fit general average conditions. Upon the pattern maker depends the final stage of seasoning which consists of holding stock for a reasonable period under storage conditions comparable to use conditions in the particular territory where he is working. The characteristics of wood must, without exception, be taken into consideration. Wood is the pattern material par excellence, but its properties must be understood and taken into consideration for the best results. The principal requirement is proper storage conditions. Before examining these in detail, some of the characteristics of all wood generally and of Idaho White Pine in particular need to be considered.

Structure of Wood

Like all other tissues of plants and animals, wood is composed of cells, the single unit of life. In longitudinal section most cells appear as greatly elongated, hollow, cigar-shaped units. They are all tightly grown together and have the appearance in magnified cross-section approximating that of a honeycomb. As may be seen from illustration (p. 5)—a cross-section of Idaho White Pine magnified about 20 diameters—most of the cells are arranged vertically in the tree. Mixed with them, and running at right angles from the pith-center toward the bark, are other cells known as medullary rays. These cells have important functions in the growth of the tree, one of which is to carry food supplies back and forth across the layers of cells.

The walls of wood cells are, of course, in turn composed of smaller units, spirally disposed in the cell walls, the individual members of which are known as fibrils. The fibrils in turn have been broken down into still smaller units known as "eye cells". Beyond a breakdown into eye cells, which is accomplished only by a complicated technic, wood has not been successfully broken down, except with a loss of structure.

Because of its structural characteristics, the shrinkage or swelling of wood with loss or absorption of moisture is not uniform in all directions. Three separate dimension changes take place with a change in moisture content. Across the width of a slash-grained

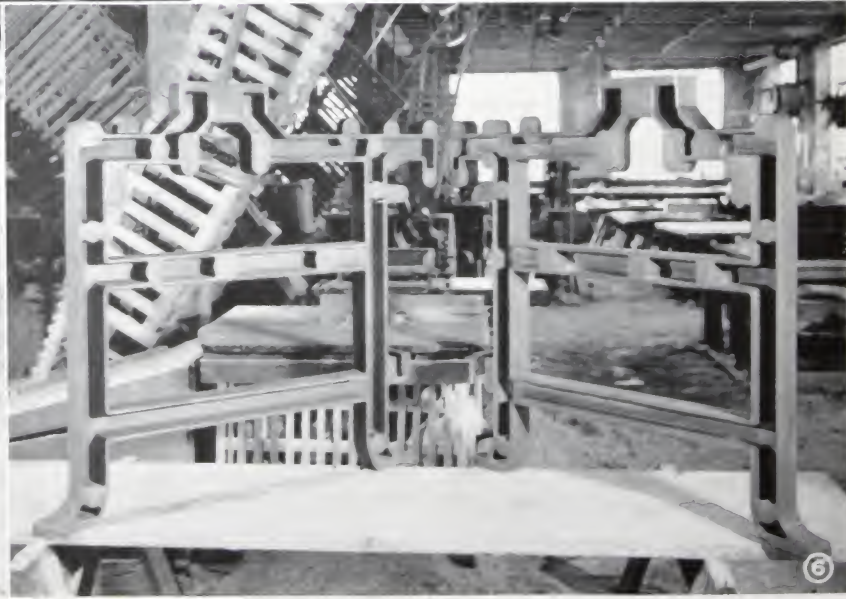
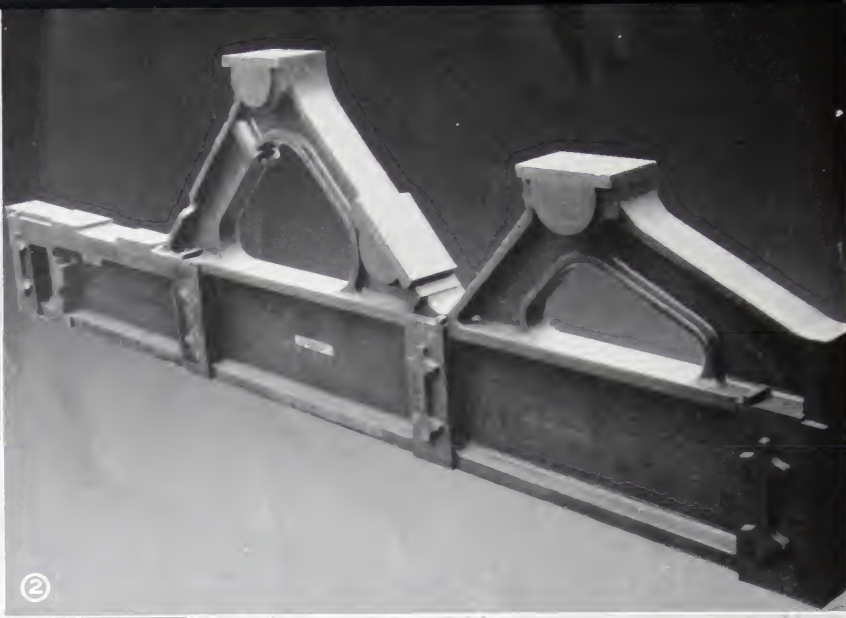
piece, the percentage change in dimension is greatest, while shrinkage in vertical-grained material in width is smaller. By the same token, the thickness of a slash-grained piece changes less than that of vertical-grained stock. Lengthwise there is so little change that it takes a special technic and precision measurements to determine the amount. For all practical purposes it may be completely ignored. These variations in shrinkage or swelling make it necessary to bring wood, for an exacting purpose like foundry patterns, very close to the moisture content it will reach under use conditions, and therefore the need for the pattern maker himself to complete the seasoning process. Anyone interested in detailed information on the shrinkage of Idaho White Pine under any set of conditions may secure it by addressing the Western Pine Association headquarters in Portland, Oregon. The widespread use and satisfactory performance of Idaho White Pine speaks for its suitability for patterns without any particular technical study of its characteristics.

Most of the ordinary problems in the use of wood, such as checking, splitting, warping, cupping, etc., are due to difference in shrinkage in different directions plus a tendency for this shrinkage to occur at different times and in different portions of the piece. All of these troubles are eliminated by carefully conditioning the stock to the moisture content it will reach in use.

One seasoning problem not related to shrinkage is stain or discoloration resulting from fungous growth or chemical reactions. This condition ordinarily occurs only in the early stages of seasoning green lumber. The stains do not interfere in any way with the use of such lumber for patterns or similar work.

Seasoning at the Mill and in the Pattern Shop

As was brought out earlier, the Idaho White Pine manufacturer can dry his product only to general average conditions. Such seasoning may be on crossers in yard piles protected from rain and sunshine or in modern automatically controlled, highly efficient dry kilns. Former prejudice against kiln dried pattern lumber has largely disappeared as the good qualities of stock dried in the modern kiln has become known to the pattern maker. However, to bring the wood into final shape for use, whether kiln or air dried, the pattern maker should maintain a stock of material sufficient for several months use so that it may come to what is known technically as an "equilibrium moisture content". The storage conditions should be as much like those of the shop or foundry as possible. Storage under heated conditions, as in a glue room, too near the boiler-room or under a sheet iron roof in the summer time, should be avoided. Likewise, exposure to weather or storage near standing water or other source of moisture is equally bad.



Idaho White Pine has the necessary physical and mechanical properties for all kinds of patterns and flasks as shown here: (1) a detailed pattern; (2) a frame pattern; (3) foundry flasks; (4) gear patterns; (5) manifold pattern; and (6) a pattern frame for a rug-making machine.

Finished patterns should have as much consideration as lumber. The pattern loft should not depart far from shop conditions or shrinkage and swelling may occur. The usual shellacking, or for that matter any other practical surface coating, will not prevent moisture changes if storage conditions are wrong. At best, any surface coating only slows down absorption or loss

of water due to surrounding air conditions. Briefly, extremes of temperature or moisture should be avoided for maximum performance of wood patterns.

If the foregoing suggestions have been complied with, and specific problems are encountered, they should be submitted to the Research Laboratory of the Western Pine Association at Portland, Oregon.

WHAT PATTERN MAKERS THINK OF IDAHO WHITE PINE

1. From G. Klein, Foreman, Pattern Shop at Philadelphia, Pa.

"The intricate designs of our machinery requires complicated patterns, which in turn demand a wood which does not warp or twist. For our purpose, Idaho White Pine has proven entirely satisfactory."

2. From C. P. Taylor, Owner of Pattern Shop at Rockford, Ill.

"I have used Idaho White Pine lumber for the last 7 years for small and large patterns and find it very fine lumber."

3. From Walter P. Haun, Superintendent, Pattern Shop at Lancaster, Pa.

"Idaho White Pine is straight-grained and clean, has a tendency to stay straight, and works good on end grain. For these reasons we prefer Idaho White Pine."

4. From Lawrence A. Svenson, Partner in Pattern Shop at Philadelphia, Pa.

"A custom pattern shop such as ours must be prepared to make patterns for a wide variety of work. We have found that Idaho White Pine meets all requirements for fine detailed pattern work, and has given us excellent results over a period of years."

5. From M. R. Rawson, President, Washington Machinery & Supply Co., Spokane, Wash.

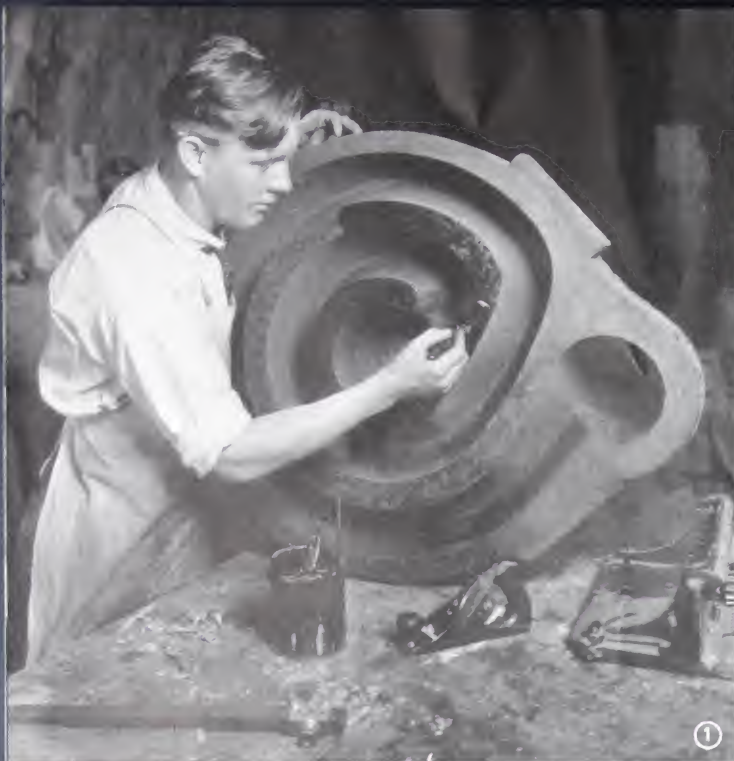
"We use Idaho White Pine exclusively for our pattern work for various reasons. In the first place, it is a light-weight wood and is easy to work while making the patterns. This is a decided advantage, especially on rush jobs. Then, too, it is a good wood to glue and nails easily, showing no tendency to split during the making of a pattern or when it is in use. Furthermore, dry Idaho White Pine holds its shape without distortion and has a uniformly soft texture. So, all in all, we have found from experience that Idaho White Pine is an ideal wood for foundry patterns. As a matter of fact, the writer believes that all foundries in this district use this genuine White Pine for patterns."

6. From Frank Z. Gessert, Foreman, Pattern Shop, American Shipbuilding Co., Cleveland, Ohio.

"In 28 years as foreman of the American Shipbuilding Company's pattern shop, I have used several kinds of woods but I have found that Idaho White Pine is the best for all around pattern purposes. We have many patterns made of Idaho White Pine that have seen service over and over again but still retain their original shape."



Idaho White Pine is used in making such marine patterns as these of: (1) intermediate cylinder for S.S. Elton Hoyt II and (2) other items at American Shipbuilding Co., Cleveland, Ohio; and (3) is well liked by all workmen in pattern shops.



Idaho White Pine is favored by pattern makers because of its excellent properties for shop uses: (1) shellacking a White Pine pattern, St. Paul, Minn.; (2) pattern for loading-end and split blank gear for roaster, Lancaster Iron Works, Lancaster, Pa.; and (3) six-foot flask (completed one at left) for casting metal threshold, bottom board and drag in center, and cope at right.

TIMBER SUPPLY OF IDAHO WHITE PINE

The commercial range of Idaho White Pine timber is comparatively restricted. The territory which contains the largest continuous forests of this wood is to be found in the Inland Empire of the Pacific Northwest, north of the Salmon River in Idaho and in the tributary areas in eastern Washington and western Montana. Here, the Idaho White Pine makes up approximately 80 percent of the commercial stand. According to the latest available estimates, the present merchantable stand of Idaho White Pine is approximately sixteen billion feet. About five hundred million feet (board measure) is manufactured annually into lumber under normal business conditions. Not all of this large volume of Idaho White Pine is suitable, of course, for pattern lumber but the figures quoted here should refute the occasionally expressed fallacy that present supply of genuine White Pine is nearly exhausted and soon will be hard to secure. Besides, forest conservation measures are being practiced in the Idaho

White Pine woods which will assure an ample future supply of this excellent pattern material.

Idaho White Pine is found in practically pure stands in northern Idaho where it grows most abundantly but is mixed with other species over large areas. It is a tree of the middle and upper slopes of the mountainous country and generally occurs at elevations of 2,000 feet to 7,000 feet. It is a straight tree with a long clear bole and a short, rather open crown. The limbs are short and of small diameter. The typical tree closely resembles Northern White Pine except that it has much larger cones. Where it attains optimum growth it reaches a diameter of from four to five feet and is from 180 to 200 feet tall. Due to its thin bark and long cylindrical trunk, Idaho White Pine yields a large volume of lumber for its diameter and height compared to other species. It belongs to the "five-needle" pines or, to put it another way, the genuine white pine group.

PHYSICAL PROPERTIES OF IDAHO WHITE PINE

Like Northern White Pine

The general appearance of the wood of Idaho White Pine is much the same as Northern White Pine, in fact even under the microscope, it fails to disclose any marked differences. It is light in color, a creamy white, and it has a subdued, inconspicuous grain, due to its uniform cellular structure. The growth ring shows only faintly. The wood weathers to a light brown with a moderate sheen.

Straight-Grained—Soft-Textured

Idaho White Pine is characteristically straight-grained and of soft and even texture. These properties in a large measure account for the wood's smoothness and fine appearance when surfaced as well as for the satisfactory way it works up, either along or across the grain, with both hand and machine tools. It is distinctly a small, sound-knotted species, and seldom shows heart shake, resin or pitch pockets.

MECHANICAL PROPERTIES OF IDAHO WHITE PINE

Light Weight

The wood is light in weight. Its specific gravity is .36 as compared to an average for the white pines of .35, indicating that the dry weight of this wood is for all practical purposes the same as the average of the white pine group. The mean weight of Idaho White Pine at a moisture content of 12 percent is 27 pounds per cubic foot, while the average of the white pines is 26 pounds. A comparison of weights of other commercial species shows 41 pounds for longleaf southern pine; 34 pounds for Douglas fir (Coast type), and 30 pounds for redwood. To the pattern maker, light weight in a wood is an important factor, not only while the patterns are made, but afterward as well. Light weight materially facilitates their handling, especially when the pattern is large, and oftentimes such patterns can be moved about without the aid of machinery, obviating the danger of damage that might involve costly repairs.

Strong for Its Weight

Although Idaho White Pine does not have strength values that are equal to those of the harder and denser

woods, it is unusually strong for its weight and has adequate strength for ordinary uses in a pattern and foundry shop. Moreover, the wood fibers cling tightly together and seldom shatter or splinter. It excels, too, in bending and compressive strength, stiffness and shock resistance.

Nails Easily

The extensive use of nails and screws in assembling patterns calls for a good non-splitting wood. It is hard to find a more perfect wood than Idaho White Pine in this respect. It nails easily and offers excellent resistance to splitting. When using screws in Idaho White Pine, the wood fibers are less distorted or broken than is the case with the harder textured woods. Shrinkage can be troublesome for the continued use of a pattern depends so much upon its ability to stay in place and keep its shape. This factor is of great importance when choosing a pattern wood. Idaho White Pine meets the needs of low shrinkage values and its wide use for many years in pattern shops speaks more effectively than words as to its serviceability.

Glues Well

The wood ranks with the best for its good gluing properties. This property, too, is highly important in a pattern shop where there is so much need of gluing wood in building up material for the patterns.

Finishing Treatments Lasting

Another need in pattern work is to get a wood that can be varnished and shellacked in a satisfactory manner to protect the pattern from moisture while in the moulding sand. Idaho White Pine is admirably suited for this purpose and it finishes up satisfactorily with all kinds of treatments. Furthermore, its texture is such that it provides a long wearing, smooth surface.

A High Class, Well Manufactured Pattern Wood

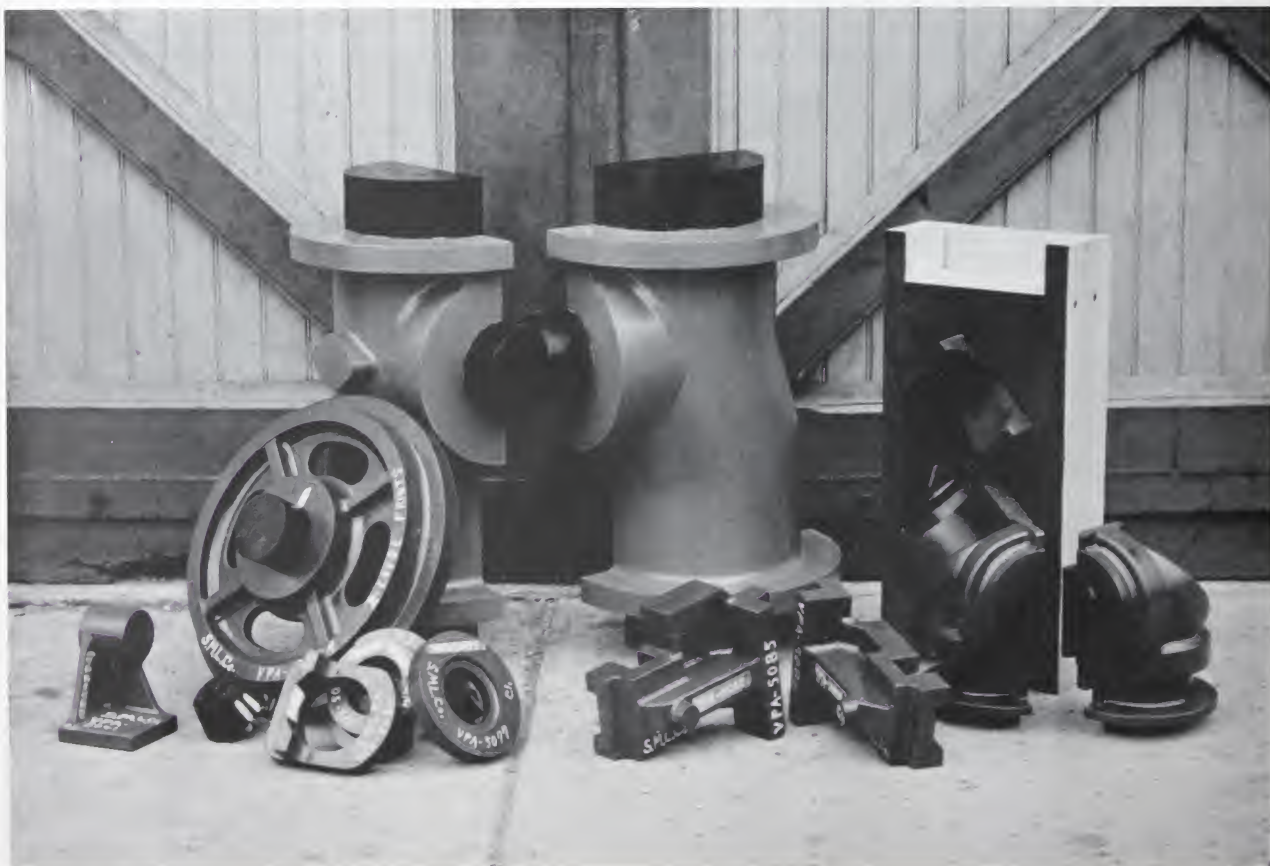
Idaho White Pine, possessing the many fine properties of the genuine White Pines, is manufactured into pattern lumber and scores of other uses with extreme care and precision. The latest in modern machinery and equipment is found at the Idaho White Pine mills. The manufacturers take real pride in their product. For years, Idaho White Pine and the other Western Pines and associated species have enjoyed a high reputation in the softwood markets of the country because of the high standards maintained in the manufacture, seasoning and grading of these forest products. Every

effort is made to place Idaho White Pine on the market in a form and condition which will preserve natural properties and at the same time meet the commercial requirements of industry in all its ramifications.

CONCLUSION

In conclusion, we hope that the preceding discussion has been not only interesting but enlightening to the pattern makers of America by pointing out that Idaho White Pine is an ideal wood for foundry patterns, core boxes, flasks and other specialty uses, because:

1. It is a genuine White Pine.
2. It has proven highly satisfactory in pattern shops after years of practical experience.
3. It has the necessary physical and mechanical characteristics required of a pattern wood.
4. It is well manufactured, carefully seasoned and expertly graded at mills, which are members of the Western Pine Association.
5. It is available throughout the country at distribution centers in standard dimensions in a wide range of grades to meet different requirements.
6. It is produced from mature timber by mills backed by an ample reserve supply.



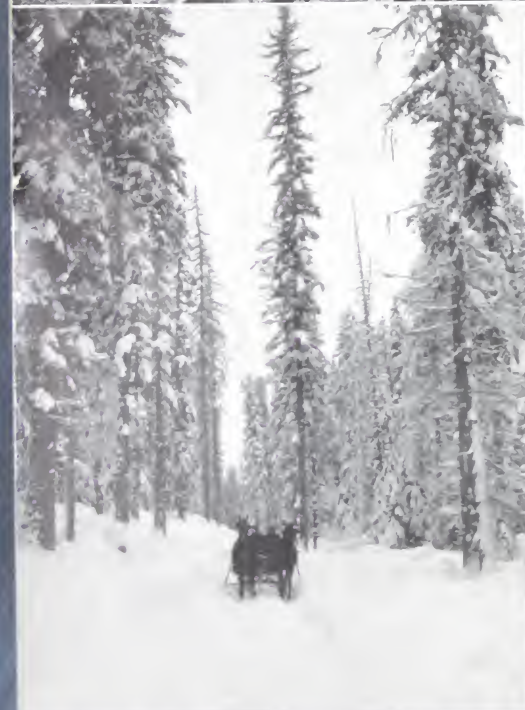
Idaho White Pine was used by Grundy & Svenson, of Philadelphia, Pa., for these patterns of rings, bearing, bracket, wheel, large and small elbow and core box.



Dry Idaho White Pine Pattern Lumber

In under-cover storage at reserve supply yards and at the mills ready for prompt shipment. The stock illustrated above is three-inch and four-inch material of varying widths.

◆ IDAHO WHITE PINE IDEAL FOR WOOD PATTERNS ◆



• IDAHO (GENUINE) WHITE PINE FOREST SCENES •